

# NSF Graduate Teaching Fellows in K-12 Education (GK-12)

<http://www.ehr.nsf.gov/dge/programs/gk12>

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- Designed to open new opportunities in STEM graduate education
- Improve the communication skills of the Nation's future STEM professionals, the STEM skills and understanding of the Nation's teachers, and the STEM knowledge of K-12 student
- Highly qualified graduate and advanced undergraduate students serve as STEM resources in K-12 classes as they complete their work towards their degree
- Students spend 10 hrs/week in K-12 classrooms, 5 hrs/week in preparation, all in partnership with a K-12 teacher

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- Available to academic institutions that award MS/MA or PhD degrees in STEM
- Awards are for 3 years, \$660K/year
- In 2004/2005 academic year:
  - o Graduate stipend of \$30K/year
  - o Cost of education allowance of \$10.5K/year
  - o Undergraduate stipends of \$5K each in academic year and summer
  - o Funds available for support of teachers, K-12 schools, and program infrastructure

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- Track 2 available as a follow-on for successful projects
  - o 5 years
  - o Total of \$2M, no more than \$500K per year
  - o Designed to promote institutional adaptation of GK-12 activities

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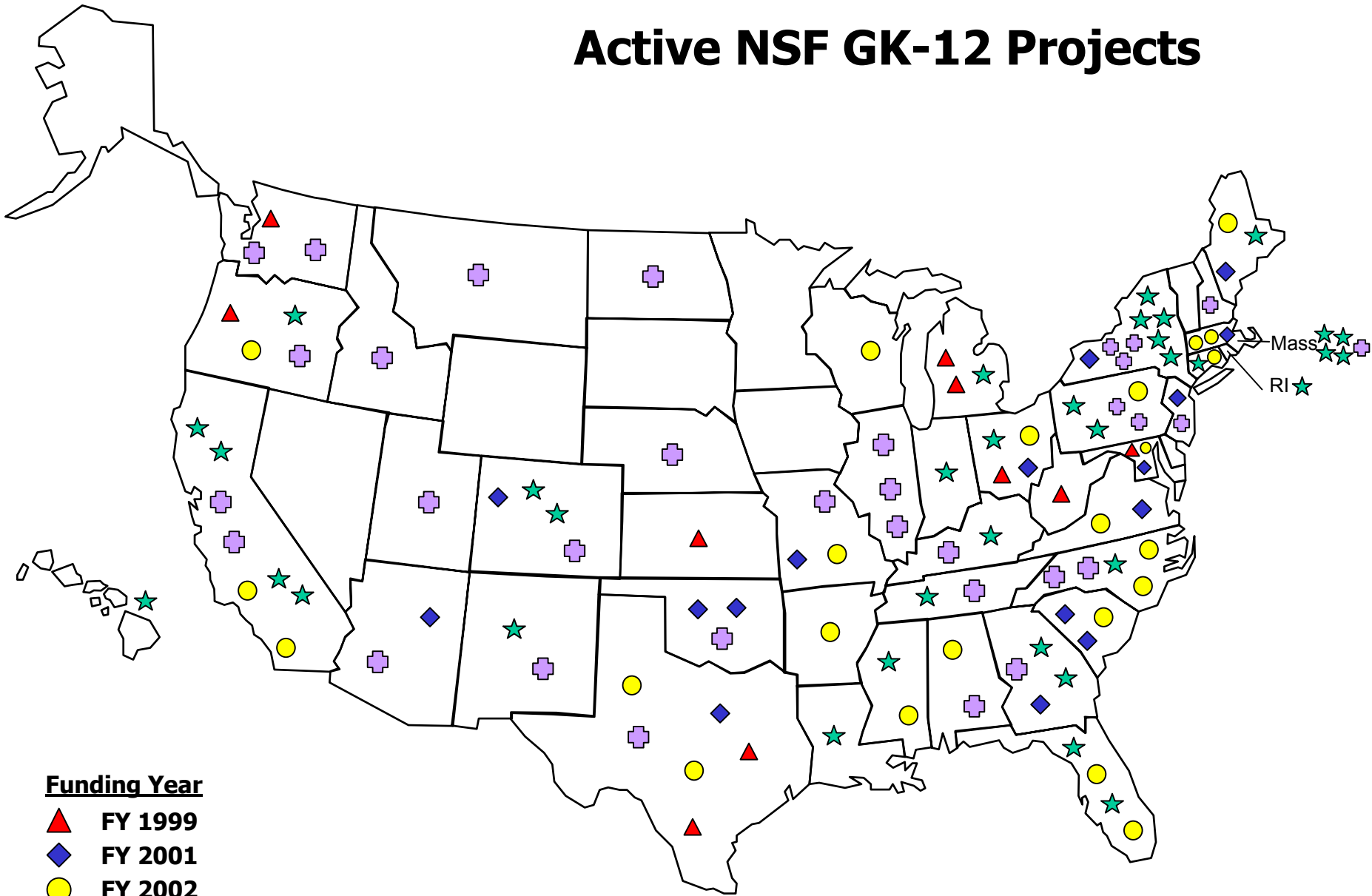
Funding Years	No. of Awards	Total Sites	Total Sites University Types Doctoral (CC)*			No. of Fellows		No. of Teachers	No. of Classes	No. of Students
			Ext	Int	Mast	G	UG			
2000	31	31	-	-	-	59	39	-	-	-
2001	25	56	-	-	-	286	120	168	200	6000
2002	23 (3)	76	-	-	-	602	282	503	663	19890
2003	36 (11)	101	-	-	-	721	288	524	976	29280
2004	34 (17)	118	86	18	11	993**	350**	-	-	-

Numbers in ( ) represent second award to same site.

\*3 sites are Carnegie classified as technical or professional.

\*\*Estimated

# Active NSF GK-12 Projects



## Funding Year

- ▲ FY 1999
- ◆ FY 2001
- FY 2002
- ★ FY 2003
- ✚ FY 2004



Puerto Rico

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## **INTERESTING FEATURES: WHAT SITES DO** **(118 projects, 41 states)**

- Almost All Have Introductory Workshops in the Summer
  - Many but not all include teachers
  - Some are being used by other projects
    - Are for credit
    - Use experienced Fellows
- Most Produce Materials
  - All reflect local needs and resources
  - Most adapt state curricula and well-designed commercial kits to meet local needs and interests
  - Some have been adapted by commercial publishers
    - Relate to the use of exemplary new curricula or kits
    - Are up on the Web

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## **INTERESTING FEATURES: WHAT SITES DO** (cont'd) **(118 projects, 41 states)**

- Some Interact With Parents and Ask For Their Input on Evaluation
  - o Survey research advisors as well as teachers and fellows
  - o Involve students and teachers in publishable research
  - o Include heavy involvement of school district administrators
  - o Feature international opportunities
  - o Leverage infrastructure or other resources for other projects
    - Project Wild, GLOBE, zoos and museums
  - o Include Fellows' presentation on GK-12 in department seminars



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## **PRINCIPAL INVESTIGATORS AND FACULTY ADVISORS:** **WHAT THEY SAY**

- The value to teachers is the ongoing onsite help they receive from professionals in the field and the chance to have someone in the classroom with whom they can discuss both content and pedagogy.
- To Fellows it provides a “unique professional development process which will transform them as future scientists and faculty members.”
- The Fellow absolutely loves the program. She seems happier than I have ever seen her at CU. The work seems to energize her instead of distracting from her research.
- The Fellow is doing very well in our program. He is enjoying his work with our local schools. I am confident that he will find a way to integrate his Ph.D. research with his interest in local community building.

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## **PRINCIPAL INVESTIGATORS AND FACULTY ADVISORS:** **WHAT THEY SAY (cont'd)**

- I have to say the program has been great for the Fellows and has really inspired her to develop interesting interactive projects for the students. She has balanced the teaching with her research extremely well and I think that everyone concerned is benefiting from her efforts – particularly the students who are being turned on to science by her enthusiasm and excellent projects. I think that this is a great program and appreciate the chance to have [fellow] participate in it.
- The Fellow has grown through the program. The Fellow has gained communication skills from his participation. His experiments seem to be going better as well. He is more efficient and focused when he is in the lab.

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Number of Fellows Participating in GK-12 Projects		
Academic Year	Fellows	
	Undergraduates	Graduates
2000	39	59
2001	120	286
2002	282	602
2003	288	721
<b>Total</b>	<b>729</b>	<b>1668</b>
<b>Grand Total</b>	<b>2397</b>	

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## Majors of Fellows - 2003

<b>Majors</b>	<b>Undergraduate</b>	<b>Graduate</b>	<b>Total</b>
<b>Astronomy</b>	2	8	10
<b>Behavioral Sciences</b>	3	2	5
<b>Biological Sciences</b>	80	236	316
<b>Chemistry</b>	14	70	84
<b>Computer/Information Sciences</b>	17	20	37
<b>Engineering</b>	72	155	227
<b>Geosciences</b>	13	35	48
<b>Mathematics</b>	24	51	75
<b>Physics/Physical Sciences</b>	17	34	51
<b>Social Sciences</b>	7	20	27
<b>Other</b>	22	84	106

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## **FELLOWS: WHAT THEY SAY**

- This affects the way I will teach as a faculty member
- Has opened my eyes to the value of working in K-12 schools and how hard teachers work
- Has given me new insight into science
  - Helped me understand concepts more deeply
  - Makes me think differently about how I approach problems
  - Helps me realize the interdependence of all science
  - Improves my ability to communicate ideas
    - To my peers
    - To the public

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## **FELLOWS: WHAT THEY SAY (cont'd)**

- I have learned to juggle multiple responsibilities.
  - o Does not seem to lengthen time to degree
  - o Something I will need to do as a scientist
- I have learned to write more clearly and directly and this has helped me with my thesis work
- It is great to see all those young minds at work. There is such potential in the classroom. It is fun to help students become excited about what excites me.

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Number of Participating Teachers					
Academic Year	Elementary Schools	Middle Schools	High Schools	K through Middle Schools	Middle Sch through High Schools
2001	43	52	64	1	8
2002	124	210	112	44	13
2003	102	226	163	6	27
Total	269	488	339	51	48
Grand Total	1195				

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## **TEACHERS: WHAT THEY SAY**

### About the Effect on their Students

- They now think of themselves as college material
- They look forward to the days the Fellows come
- Their science vocabulary has increased
- Increased enthusiasm for science
- Improved performance on exams
- Improved attendance
- My students now ask, 'What does it mean?' They will even guess answers using prior knowledge and they are reasonable guesses.



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## **TEACHERS: WHAT THEY SAY (cont'd)**

### About the Fellows

- The college kids are cutting edge. Their optimism fuels our own.
- There is a generational tie between the Fellows and the K-12 students. The high school kids now think of themselves as college students or potential college students (from an inner city high school).

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## **TEACHERS: WHAT THEY SAY (cont'd)**

### About Themselves

- This program found me. The Principal asked me to participate. She thought it would be great for the school and it is. Having someone to bounce ideas off of is great.
- The stuff the Fellow does goes with the curriculum but doesn't quite fit without some planning. So having a Fellow allows us to expand the curriculum. Kids love it when she comes in and it opens my eyes to new material and how to use it. When she leaves we'll continue using what we've developed, but she's brought in ideas I never thought of.
- This is novel for me, to get a chance to talk with someone about how I teach. It reminds me of why I love to teach.

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Number of Participating Schools					
Academic Year	Elementary Schools	Middle Schools	High Schools	K through Middle Schools	Middle Sch through High Schools
2000	3	7	3	0	1
2001	23	41	31	5	6
2002	42	87	54	24	8
2003	38	106	76	6	15
Total	106	241	164	35	30
Grand Total	576				

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Type of Participating Schools			
Academic Year	# of Schools		
	Urban	Rural	Suburban
2000	11	0	3
2001	63	19	24
2002	153	45	17
2003	121	60	60
Total	348	124	104
Grand Total	576		

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K-12 Class – Subject Matter						
# o f c l a s s e s	Academic Year	2001	2002	2003	Total	Grand Total
	Biology	80	66	104	250	
	Chemistry	13	34	29	76	
	Computer Science	0	5	5	10	
	Earth Science	23	26	77	126	
	Elementary Science	0	80	89	169	
	Elementary Mathematics	5	33	54	92	
	General or Integrated Science	53	234	366	653	
	Mathematics	21	86	111	218	
	Physics	1	15	9	25	
	Other	4	84	129	217	1836

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## **OUTCOMES – GK-12 AS A CATALYST**

**(We were there, but GK-12 is often not the only intervention)**

- An inner city high school in Philadelphia has its first AP class – IN CHEMISTRY and a solar car that won a major regional contest.
- At an inner city school in Seattle where only 1-% of the 4<sup>th</sup> grade students met the standards on the state math tests pre-GK-12 participation, 45.5% met or exceeded the standards the second year of participation and 60% did so during the third year.
- High school students in Seneca Falls, New York have engaged the town in a study of the social and scientific issues allied to a national dump and landfill adjacent to their town. This is part of a program leading to an EPA Environmental Quality Award.

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## **OUTCOMES – GK-12 AS A CATALYST (cont'd)**

**(We were there, but GK-12 is often not the only intervention)**

- Children and teachers in Puerto Rico now have an annotated set of information concerning the coral reefs in their locality.
- Hard-of-hearing students help design sign language for complex concepts in chemistry and physics with the help of a Fellow proficient in American Sign Language. They are slated to become a permanent part of the signing used in their state. The students themselves are competing in science fairs for the first time and placing at the regional level.
- At a university in Ohio the College of Science is now considering modeling their graduate assistant training after their GK-12 model.







A University of Rhode Island GK-12 Fellow (Catalina Martinez) and a student hold a flounder during a field experiment. The GK-12 Fellows received extensive training and were paired with teachers in grades 4-8. Both the Fellows and teachers attended a summer institute focused on marine science content and on pedagogy.



**Building Circuits**



**First Grade Science in San Diego**



**Cornell Ecology Trips**



*The assembled 3-D topographical map is displayed by some of its creators at the Centennial Celebration of the National Wildlife Refuge System.*



*Working in small groups, elementary school students create portions of a three-dimensional topographical map of Sunkhaze Meadows National Wildlife Preserve.*





*Steve coordinates Kenyan students in a "lap-sit" to illustrate ecological interdependence.*



*Colin Jackson (center), Director of A Rocha Kenya, shows a Kenyan school teacher how to determine a bird's age.*

GK-12:  
GRADUATE  
TEACHING  
FELLOWS  
IN K-12  
EDUCATION





**Kids and Balloons**

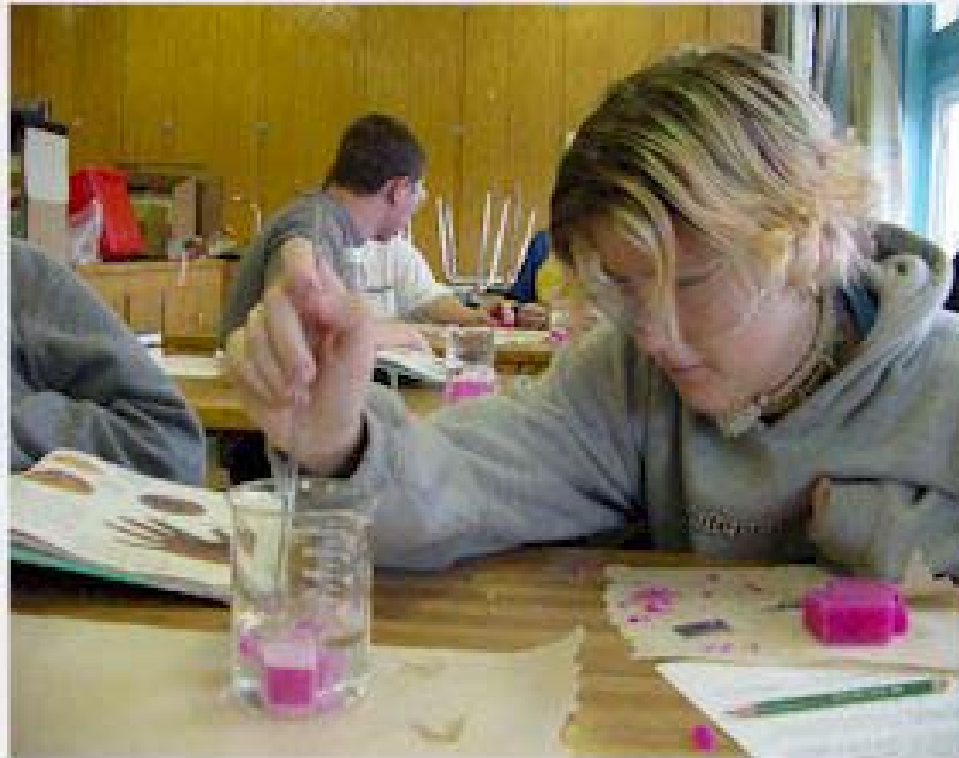




## Kids and Chemistry

**At Vanderbilt**





*Studying diffusion.*



**University of Arizona  
Elementary study of butterflies**